NASA TECH BRIEF

Tungsten Wire and Tubing Joined by Nickel Brazing

The problem: Brazing thin ($\leq$ 0.020-inch diameter) tungsten wire to tungsten tubing having a diameter of approximately 0.26 inch. Previous attempts to join these components using various brazing metals resulted in severe oxidation and deterioration of the tungsten.

The solution: The tungsten wire and tubing are brazed using a contacting coil of nickel wire heated to its melting point in an inert-gas atmosphere.

How it's done: Two to six turns of the tungsten wire are coiled on a mandrel to the outside diameter of the tungsten tubing, taking care to avoid reverse bending of the wire. The coil is then slipped off the mandrel and onto the tungsten tubing at the desired location. Nickel wire of the same diameter as that of the tungsten wire is similarly formed into a coil which is then slipped onto the tubing. The nickel coil is positioned so that the individual turns lie between and in contact with the tungsten wire.

The tube-coil assembly is placed in an oven provided with an atmosphere of purified argon. The oven temperature is brought up to the melting point of nickel (2651°F) and the brazing is allowed to proceed at this temperature for 30 minutes. At the end of this period, the heat is turned off and the assembly is allowed to cool in the oven.

Notes:

1. The assembly should be carefully inspected under magnification to ensure that the tungsten wire is intact, since this metal is subject to recrystallization.
2. This procedure can also be used to braze tungsten to tungsten-rhenium parts
3. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Marshall Space Flight Center
   Huntsville, Alabama, 35812
   Reference: B65-10391

Patent status: NASA encourages the immediate commercial use of this invention. It is owned by NASA and inquiries about obtaining royalty-free rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

Source: Auto-Controls Laboratories under contract to Marshall Space Flight Center (M-FS-394)

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